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Maritime Research Division

SCIAA's Maritime Research Division Lends Helping Hand to Mexico

By Christopher F. Amer

On a nearly cloudless day in June, Jim Spirek and I stood in the computer cabin of the research vessel *ITMAR III* staring at the array of familiar-looking computers and cables linking the units to each other, the Trimble GPS antenna set high atop the bridge and the remote sensing "fish" racked on the aft deck. The only other familiar thing was the oppressive heat and humidity. The scene out of the porthole was not that of a South Carolina marsh. Rather, around us, shrimp boats were stacked two or three deep at the quays, their equipment spread around the docks while crews welded superstructures, creosoted cables, and repaired nets in preparation for the upcoming shrimping season, which was to open in less than two months. Behind the port of Lerma, the main port for Campeche, Mexico, the hills reflected the heat back on us and caused the hot wind streaming across the Yucatan to speed across the Gulf of Mexico.

Our presence in Mexico was

propagated by an urgent request the previous year from Pilar Luna Erraguerrena, Subdirectora de Subdirección de Aquelogia Subacuatica for Mexico's Instituto Nacional de Antropología e Historia (INAH), the Mexican equivalent to our National Park Service. In 1998, INAH had purchased a custom-built marine remote system from Sandia Research Corporation in New Mexico. The ESPADAS system was one of only two units produced by Sandia, the second, identical, system (ADAP III) going to the Maritime Research Division of SCIAA (see *Legacy*, Vol. 3, No. 2, 1998). Their archaeologist, who had operated ESPADAS since 1998, left INAH in 2003 to pursue a PhD elsewhere, leaving them with little experience in using and troubleshooting the system. INAH was about to begin its fourth field season since 1997 of an ongoing project to inventory and diagnose the submerged cultural resources in the Gulf of Mexico and to look for the sunken



Fig. 2: The author monitors the magnetometer computer during a survey. (SCIAA photo by Roberto Galindo)

remains of *Nuestra Señora Del Juncal*, which sank in 1631, some 150 kilometers west of Campeche.

Pilar requested that SCIAA assist them with troubleshooting ESPADAS, which was not working, setting up the system and the survey, and training their archaeologists and staff in the use of the equipment, marine archaeological survey techniques, and ship construction. She also brought down Marc Andre Bernier from Parks Canada's Underwater Archaeology Unit to train their team of divers, many of whom had limited archaeological experience in underwater survey and recording techniques. The course Marc conducted, was based on one developed by the Nautical Archaeology Society in England, and was very similar to the one developed by Lynn Harris for SCIAA's Sport Diver Archaeology Management Program in the early 1990s to train Hobby divers to assist SCIAA.

With all expenses paid by the Mexican government, Jim Spirek and I agreed to fly to Campeche and



Fig. 1: The Research Vessel *ITMAR III* in port at Lerma. (SCIAA photo by Christopher F. Amer)



Fig. 3: Jim Spirek instructs Lisseth Pedroza, one of the INAH archaeologists, in the use of the ESPADAS system. (SCIAA photo by Christopher F. Amer)

work with Pilar's group. Roberto Galindo was in charge of the ESPADAS and the survey logistics for the project, while Vera Moya, a recently graduated archaeologist from Mexico City would handle the Geographical Information System (GIS). During three weeks in November and December 2003, utilizing experience gleaned from working on our own system, we worked with Roberto and the crew checking connections, tracing wiring bundles, reconfiguring computer settings, installing software, and performing numerous other "tricks" to get the system up and running. Unfortunately, Jim had to return to South Carolina just before we put to sea to test the system and conduct the survey. However, he did not get off that easily and returned to Mexico for the last week of survey. But more on that later.

Fall and winter are the season for *El Norte* in the Gulf of Mexico. These bands of storms swoop down across the Gulf at fairly regular intervals, bringing with them high winds and torrential rain. The Mexicans take *El Norte* very seriously, and so they should. The fronts of these storms

vessels. A week later, with a second window of opportunity rapidly closing, *ITMAR III* slipped out of port shortly after dusk and headed into the sunset. Early the next morning we awakened to the crashing of waves against the hull and the shouts of *ITMAR III*'s crew. The nine members of the survey crew stumbled out onto the heaving deck to discover that another *El Norte* was headed our way and the waves and wind ahead of the front had sunk the launch, which was towed behind the vessel. After recovering the stricken launch, the captain headed for the only shelter in the area, Cayo Arcas. By the time we reached Arcas, *El Norte* was upon us and by late evening the lee of this tiny islet was home to dozens of fishing boats and craft associated with the oil and gas industry. Astern of us sat one of the larger oil drilling platforms in the

often stretch from Florida to Mexico City and descend on the unwary boater rapidly and with a vengeance. Our initial departure from Lerma was delayed due to the approach of one of these *nortes*, which closed the port to all outgoing

Gulf. Owned by Pemex, Mexico's largest oil and gas company, this rig supplies oil to nine pumping stations, each of which can accommodate a half-million ton tanker. At night the scene looked like a floating city with a huge castle lit up like a Christmas tree. By day, the rigging of *ITMAR III* was the home to dozens of frigate birds, which kept us company throughout much of the survey.

After two days, the storm passed, and we could begin our survey. The location chosen was one of the areas where historical documents suggested the wreck might have gone down. The Spanish fleet had left Veracruz in October 1631 and *Nuestra Señora Del Juncal*, the capitana of the fleet, had become separated from the other ships due to a broken mainmast. Caught in a *norte*, the crew attempted to reach the safety of Campeche when the ship was overcome and foundered.

The balance of the survey was fairly uneventful, except for periodic computer shutdowns, usually caused by conflicts in the software, and one

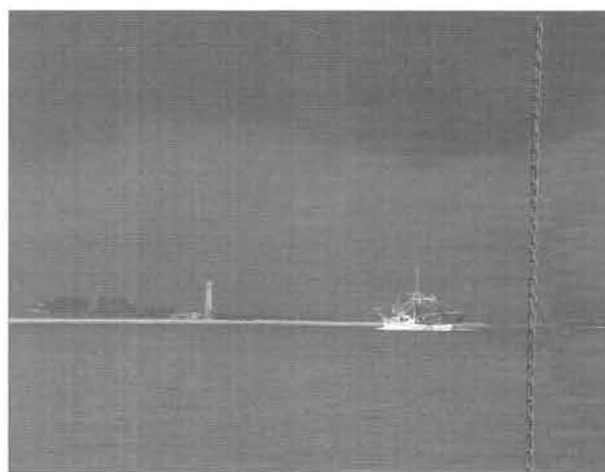


Fig. 4: Cayo Arcas as the front of *El Norte* approaches. (SCIAA photo by Christopher F. Amer)

event when the magnetometer tow fish hit the bottom in 20 meters of water causing damage to the tailfin assembly. Jim arrived back on the second day of survey, ferried out the

See MEXICO, Page 22

MEXICO, From Page 21

100-plus kilometers to *ITMAR III* in a Campeche Police Boston Whaler, which also delivered much needed supplies like Coca-Cola and chocolate bars. In exchange for Jim, two of the Mexican crew returned to Campeche. During the six-day survey we towed the magnetometer sensor from early morning until after dark, covering



Fig. 5: The Pemex oil drilling rig, and Arcas, after the storm. (SCIAA photo by Christopher F. Amer)

some three square kilometers of survey area in 15-meter-lane increments, but detecting only a few small magnetic anomalies. However, the survey afforded the Mexican crew an opportunity to get used to the equipment and put into practice the training we had given them, while working in a variety of sea conditions, ranging from calm to stormy seas. Shortly after finishing our last survey lane of the season, *ITMAR III* was buffeted by another *Norte* that swooped down on us with amazing speed. Jim had missed the *Norte* at the beginning of the survey. Now he was treated to a nine-hour ride back to Campeche riding the front of one.

When we returned to Campeche, Jim and I set about training their archaeologists in post-processing procedures, setting up a GIS project for the survey, and interpreting the survey results. With the assistance of

INAH computer technicians, the computer operating systems were upgraded to Windows 98. We also left them with a "to do" list to maintain the equipment and prepare for the next field season. Amid the hustle and bustle of problem solving, survey and training, there was still time for a day trip to Edzná, one of the largest Mayan sites in the region.

Early this year, we received a request from INAH to continue our support and training for their underwater archaeological crew. With the approval of SCIAA's director, the University, and the State Legislature, we returned to Campeche, Jim for 10 days in June and myself for the month. If the 2003 field season was characterized by software conflicts and problems, 2004 was the season of equipment failures and logistical problems. Two days before we flew to Mexico, the project's funding was pulled, which meant that INAH could not pay for *ITMAR III*. This was an inauspicious start to the field season because the team had already left their base in Mexico City and was assembled in Campeche.

This wrinkle in the project led us to devise a revised methodology. Instead of continuing the search for *Nuestra Señora Del Juncal* offshore, we would coordinate with their dive team and implement a near shore coastal survey using a



Fig. 6: Jim Spirek and the author conducting a survey aboard *Zayosal*. (SCIAA photo by Roberto Galindo)

nine-meter long launch provided by the INAH office in Campeche. As part of their research design, the team was already developing a sizable database of wrecks near the coast, based on reports from local fishermen. For the first week in June, we worked on the launch, *Zayosal*, installing the ESPADAS system and modifying the boat's characteristics for surveying with a crew of five. After field trials, we set about conducting magnetometer and sonar surveys at reported shipwreck locations provided to us by the local fishermen. If a survey revealed an anomaly and/or acoustic contact at a reported location, the dive team was dispatched to ground truth the site. If nothing was picked up on the survey equipment, the divers did not have to dive that location. This methodology



Fig. 7: The author investigates the wreck of a steamboat. (SCIAA photo by Eugenio Aceves)



Fig. 8: Deploying the magnetometer towfish aboard *Zayosal*. (SCIAA photo by Christopher F. Amer)

allowed the team to rapidly verify the veracity of a number of reported wreck sites in a day without having to deploy divers.

One of the drawbacks of surveying in a small open boat became clear to us on the fourth day when we were caught 25 kilometers along the coast from Campeche in one of the numerous rain squalls that frequent the Yucatan and Gulf during the rainy season. Judicious use of tarps and bailers by the crew, and the presence of the sheltered harbor of a resort at just the right moment averted catastrophe. A couple of days later, INAH's funding was restored, and we could move the ESPADAS system onto *ITMAR III* and prepare that vessel for survey operations. And this is where the equipment problems began.

A test of the survey system quickly led us to the realization that all was not well. The ESPADAS system was not functioning properly. After several phone calls, we managed to enlist the services of

INAH's chief computer technician, Mario, who came aboard and after several hours practically crawling inside the computers, announced that we were facing massive hardware problems. Mario replaced the motherboard in the magnetometer computer, but persistent and

ongoing problems with the other two computers necessitated him staying with us throughout the survey. Over the course of the next few days, wires in both the magnetometer and side-scan sonar tow cables broke, leaving us with only one cable for each piece of equipment. Then, a collision of the sonar towfish with the bottom damaged the remaining cable reducing the sonar to a single channel system. To add insult to injury, just as we began imaging a new shipwreck target with the sonar, the motherboard in the sonar computer melted after the cooling fans stopped. Mario solved the latter problem by building a new sonar computer at home one evening, but

we were forced to operate the remainder of the field season with no backup tow cables and only the right channel of the sonar receiving data.

By the time we got everything more or less functioning I had only a week until my return to South Carolina. During that week, we investigated several reported shipwreck locations along the coast and found a previously unknown wreck. During that time, I also had

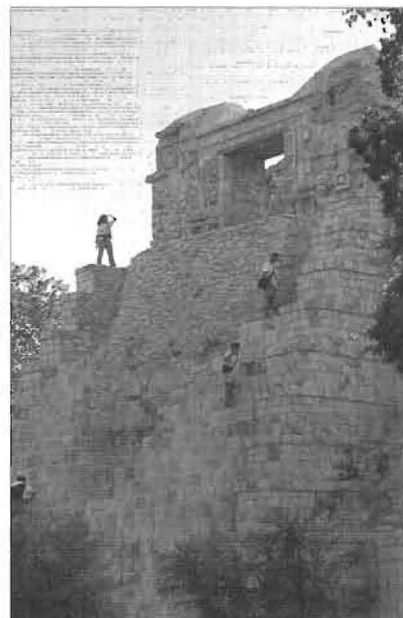


Fig. 10: Members of the INAH team climbing the palace at Santa Rosa Del Xtampak. (SCIAA photo by Eugenio)

the opportunity to dive on, and record, several sites with the Mexican archaeologists and experience the

range of sites present off the coast of Campeche. These included, a 19th century steamboat, a 1970s shrimp boat, the scattered remains of a large diesel-powered vessel, and a long, natural depression possibly caused by a subterranean tunnel collapse. Before each of these dives the crew met to discuss methodology, which gave me an opportunity to



Fig. 9: The main temple at the Mayan site of Edzna. (SCIAA photo by Christopher F. Amer)

See MEXICO, Page 24

MEXICO, From Page 23

suggest revised or alternate strategies. At the end of each day we again met to review the day's underwater drawings, still images, and video footage of the sites and to discuss various interpretations of each site.

With my impending departure rapidly approaching, the team took a day to make the pilgrimage to another Mayan site. Santa Rosa Xtampak is the site of a huge Mayan city that was once a regional capital of the Mayan world. Covering some 10-square kilometers on a hill whose top had been leveled, Xtampak lies some 120 kilometers south of Campeche. Unlike many of the Mayan sites in the area that have been reconstructed for tourism, Xtampak is in a relatively early stage of excavation, having only two

jungle was doing its best to reclaim. The road, that often resembled a streambed, did not allow us to even reach half the 70 km/hr speed limit, a limit obviously imposed at an earlier time.

The following day, I left Campeche and flew east over Cayo Arcas, one of the numerous islets that indicate the transition between the relatively shallow water of the Gulf and the line of darker blue water where the seafloor drops away to more than 500 meters deep some 170 kilometers east of the city. I knew that the Mexican crew still had another month of surveying remaining near Arcas and Los Triangulos. However, with the two seasons of training and experience, as well as having Mario onboard, I knew they

that was symbiotic, was troubleshooting the troublesome ESPADAS system. Until 2003, ESPADAS was used infrequently. Now that it is being used on an annual basis, the equipment is assembled and disassembled for each field season and transported great distances by road from its base in Mexico City to the survey locales. This treatment takes a toll on six-year-old computers. In contrast, the MRD's ADAP III system largely remains installed in our *C-Hawk* survey vessel and is used on a fairly regular basis thanks to grants, many of which come from the Archaeological Research Trust. Consequently, after the initial problems, including Y2K compatibility issues, had been rectified, we have little need to perform surgery



Fig. 11: The survey and vessel crews of the 2003 Survey Expedition. (SCIAA photo by Christopher F. Amer)

structures reconstructed. The site, like most cultural sites in Mexico, is managed by INAH. While officially open for tourists, Xtampak has only received four visitors in the last year. The trip to the site took us over 3 hours to go the 120 kilometers, half that time spent traveling the last 32 kilometers along a road that the

would do well.

During the two field seasons that Jim and I worked with INAH, we met our primary goal of training their archaeologist in preparing and conducting marine archaeological surveys and post processing and interpreting the results. However, the most valuable training, and one

on the inner workings of the system, which was assembled the same year as ESPADAS. The work in Mexico afforded Jim and I the opportunity to deal with issues that, touch wood, our system may never experience. However, if it does so, we are ready.